

15 October 1958

MEMORANDUM FOR: Office of Logistics/Procurement Division/Contract Branch

SUBJECT: Request for Initiation of Task 13 under Contract RD-132

1. It is requested that your office take the appropriate action to establish Task 13 under Contract RD-132

This task will cover a program for the testing and evaluation of the new RT-3. The work is to be accomplished in accordance with the contractor's proposal attached hereto. The power supplies and transmitters to be evaluated in this program will be supplied to the contractor by the TSS/ED project engineer. Since these units will be tested to destruction, accountability for these items has been dropped.

2. Funds in the amount of \$19,532.00 are to be made available to the contractor for the performance of this work, which will be accomplished by March 1960. Charges for these funds are to be made against Allotment Number 9-2502-75-301.

3. Contract RD-132 is an Agency sterile contract. Task 13 should also be Agency sterile. Government interest may be shown. All of the items involved in this program are classified Secret and should be treated as such by the contractor. Agency interest in all work and material under the contract and Task is classified Secret and may be divulged only on a need-to-know basis to appropriate security approved personnel.

The Contracting Officer is requested to advise the contractor's representative in writing of these security classifications.

In the event there is any variation in classification during the preliminary phases of the work, further guidance will be provided by the project engineer, Room 210, West Outbuilding, extension

Chief

TSS/Engineering Division

Attachments:

TSS-913-27-1454-53

Proposal dtd 21 Aug 58

APPROVED FOR THE OBLIGATION OF FUNDS:

REC	2	16 JUN 1959	BY 064540
ORIG COMP	056	56	TYPE 02
ORIG CLASS	5	14	REV CLASS 25
JUST	22	NEXT REV 2010	AUTH: HR 10-2

Research Director

Date

ED/P/SS/ED/ME

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S E C R E T

TITLE - (NOT TO EXCEED 40 LETTERS AND SPACES)

Transmitter Evaluation

DOCUMENT IDENTIFICATION NO.

92-61-18

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CONTRACT NO.

U.S.-132

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1**92-61-19****8/21****JJB****8/21****JJB****2****3****4****5****6****7****8**

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92-61-18

August 21, 1958

SUBJECT: TRANSMITTER EVALUATION

Dear Andy:

In accordance with your request of August 8, 1958, we are quoting the evaluation of an FM transmitter as described in the attached technical proposal, [redacted] dated 14 August 1958. The cost breakdown is as follows:

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Engineering, Direct Labor	\$ 5,590
ILE, 188% (GEL)	10,510
Material and other Charges	<u>400</u>
Sub-Total	\$ 16,500

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TOTAL COST PLUS FEE	\$ 19,532
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It is certified that the ILE and G&A rates used above have been approved by the Resident Air Force Auditor.

The work proposed in Annex I can be completed by 20 January 1960. It is proposed, providing acceptance of this proposal is culminated prior to 15 September 1958, that the following reports will be issued:

- 21 November 1958 - Interim report covering Lab bench tests.
- 1 June 1959 - Final report including all test results except life tests.
- 20 January 1960 - Supplement to final report covering life test results.

In order to meet the completion dates stipulated above, we request an additional extension of an estimated four (4) months on Contract RD-132, Task Order No. 7, amending the completion

92-61-79

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21 August 1958

date up to and including 30 November 1959, and Task Order No. 12 up to and including 20 December 1959. We should like to propose that this quotation, if approved, be designated Task Order No. 13 under the basic contract.

This quotation is made subject to your furnishing the following equipment:

1. Six RT-3 transmitters with AC supplies, microphones and antennas.
2. Three RT-3 transmitters with DC supplies, microphones and antennas.
3. Full spare tube complement.
4. One Receiver.
5. One ASR-1 Receiver.

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Items 4 and 5 are on hand.

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ANNEX I

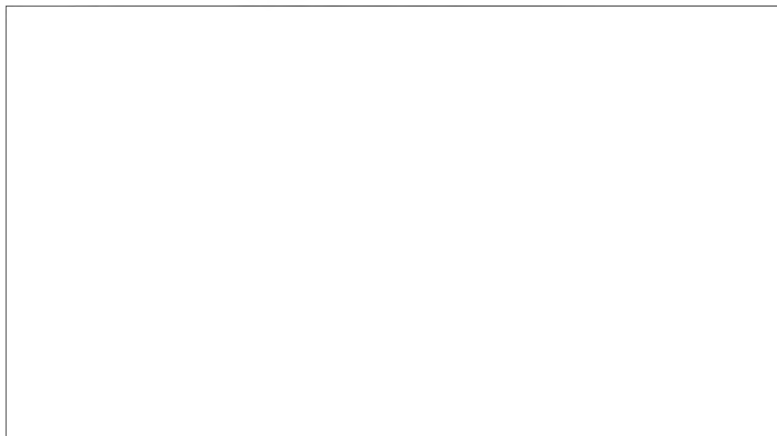
TRANSMITTER EVALUATION



14 August 1958

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PREPARED FOR



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SECRET**TRANSMITTER EVALUATION****PURPOSE**

The primary objective of this proposed program is to obtain, through test and observation, sufficient data to allow evaluation of the performance, suitability and reliability of one type of portable transmitter. A secondary objective is the generation of conclusions and recommendations as to engineering modifications and operating techniques which may improve the value of the equipment. The transmitter to be appraised is the RT-3 with AC and DC power supplies. An interim report and a final report will present the results of the program.

DISCUSSION OF THE PROBLEM

To be of maximum use, a transmitter must fulfill a number of important technical and operational requirements. The characteristics of the equipment relating to these requirements must be measured or otherwise determined to allow valid evaluation. Because direct comparison with other equipment is not possible, any determinations made must stand alone.

Reliability of the equipment is of great importance.

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Of equal importance is basic technical performance of the equipment alone. Installation will, in nearly all cases, reduce performance. Therefore, it is important that the equipment have good basic performance. Performance factors include transmitter range in terms of power output and antenna directivity and efficiency;

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audio range in terms of sensitivity, intelligibility, and linearity. The effects upon these factors of such external influences as orientations of parts, power source variations and deterioration with life should be measured as far as possible.

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The last appraisal factor is that of utility which includes such items as ease of installation, operation and maintenance and the influence of various installation conditions upon performance. Because more care can be afforded in installation and adjustment to achieve optimum conditions, deleterious effects usually can be minimized.

Measurement or observation of these factors should provide the necessary information upon which a sound evaluation can be based. This information will also provide the basis for recommendations for improvement of the devices and of instructions for any desirable special operating or installation techniques.

PROPOSED PROGRAM

The program for testing of the transmitter will be conducted in three phases: Laboratory Test, Field Test, and Life Test. Reports will be issued at the conclusion of each stage. An interim report will present the results of the laboratory tests. The final report, issued upon completion of field testing, will summarize all test results obtained at that time. A supplement to the final report will be issued following the conclusion of life tests and will cover only the results obtained from the life tests.

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Nine transmitters will be required for the program. Six should be furnished with AC power supplies and three with DC. Two of the AC units will be placed in life test. Two of each type will be utilized in the test program. The remaining units will be held as spares in the event of failure of any of the units undergoing test. Spare tubes sufficient to make full replacement in all units should be furnished.

Measurements will be made under as closely controlled conditions as practical. Because competing equipments are not being tested, comparative tests cannot be made. This fact makes more difficult the devising and conduct of field tests, many of which necessarily require subjective measurements. Measurements will be made objectively, wherever possible, using standard, precision, laboratory instruments.

TESTS TO BE PERFORMED

While it is beyond the scope of this proposal to describe, in detail, the tests required the following listing is indicative of the types of tests to be performed. Tests of characteristics which are not influenced by the source of power will be performed only with the AC supplies. Tests wherein the power supply or its connections may influence the results will be performed with both sources of power.

Except where they are test variables, the following parameters will be standardized throughout the program:

Warm-up time	1 hour
Line power	115 v 60 cps
Audio signal frequency	1 KC
Gain Control	Maximum
Deviation Control	Exact setting unknown, to be determined to give a near peak value compatible with bandwidth and with a fixed, limiting, audio input signal.

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I. Repeated Tests - Before and after any specific tests the following checks will be made and recorded:

- a. R.F. Power output (50-ohm load).
- b. Noise level.
- c. Deviation control range (e.g. deviation sensitivity).
- d. Frequency response (e.g. upper and lower audio, half-power as determined by deviation measurement).
- e. Cumulative Operating time.

II. Laboratory Tests

A. R.F. Measurements

1. Power output.
2. Antenna match efficiency - power output for various dummy loads.
3. Spurious outputs - harmonics, sub-harmonics, parasites.

B. Audio Measurements

1. Transmitter audio frequency response for various settings of the deviation control.
2. Deviation sensitivity from noise level to overload.
3. Microphone frequency response for BK6-B and MC-30 microphones.
4. Frequency response of microphone - transmitter combination.
5. Harmonic Distortion.
6. Intermodulation distortion.
7. Articulation tests made in anechoic room with master tape. Runs will be made with MC-30 and BK6-B microphones with the receiver and with the ASR-1 receiver. All deviation will be adjusted to match the receiver used. All runs will be recorded on tape.

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C. Temperature and Humidity Effects - Temperature range of 0° to 50°C will be covered.

1. Radio Frequency shift.
2. Deviation sensitivity.
3. Frequency response (half-power points).
4. Power output.
5. Noise Level.
6. Case surface temperature.
7. Temperature will be increased to failure of one unit only.

D. Power Source Effects

1. Variation of line voltage around 115 v and 230 v, 50 and 60 cps, nominal values.
 - a. Line power input.
 - b. R.F. Power output.
 - c. Deviation sensitivity.
 - d. Frequency response (half power points).
 - e. Radio frequency shift.
 - f. Noise level.
2. Battery life with fresh batteries
 - a. Battery potentials and currents at e on terminal.
 - b. R.F. Power Output.
 - c. Noise level.
 - d. Time.
 - e. Note battery element failing first.

E. Miscellaneous Observations and Inspections

1. Ease of handling and adjustment during tests.
2. Structural weaknesses or under-rated components.
3. Unit using DC power supply.

4. Visible and operational effects of shock and vibration of handling and commercial transportation.
5. Vibration of case at power line frequencies.

III. Field Tests

A. R.F. Effects

1. Field intensity at fixed range for several orientations of case antenna and cables. We will attempt to determine the best and worst orientations. This test will be made with both AC and DC supplies.
2. Field intensity two feet from a long conductor at parallel and normal orientations to antenna.
3. Field intensity at best and worst orientations of the following antenna types:
 - a. A dipole made with coaxial line and two, quarter-wave wires.
 - b. A "J" antenna with coaxial line.
 - c. A dipole with coaxial line, an external balun match and quarter-wave radiators.

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5. Apparent maximum range from "typical installation" measured along several radials using ASR-1 receiver.

B. Audio Effects

1. Articulation tests will be made with MC-30 and PK6-B microphones using the and ASR-1 receivers. One run will be made for each combination.

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IV. Life Test

A. Initial checks will be made on all units early in the program. Two representative units will be selected for life test. 25X1

C. One unit will be operated from 115 v, nominal, the other at 230 volts. Periodic checks will be made of line voltage to determine extreme variations.

D. Units will be timed to operate two eight-hour periods daily.

E. Approximately every 200 hours of operation checks, listed above under repeated checks, will be made. Operation will be monitored daily.

F. In the event of tube failure, tubes will be replaced and the unit returned to life test. Failure for other reasons

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will cause the unit to be replaced by a spare unit. Upon completion of laboratory and field tests of other units these transmitters will be added to the life test group and run in continuous operation.

G. Life test will extend to a maximum of one calendar year.

EQUIPMENT TO BE FURNISHED BY CUSTOMER

The following equipment will be furnished by the customer:

1. Six RT-3 transmitters with AC supplies, microphones and antennas.
2. Three RT-3 transmitters with DC supplies, microphones and antennas.
3. Full spare tube complement.
4. One Receiver.
5. One ASR-1 Receiver.

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Items 4 and 5 are on hand.

FINAL AND INTERIM REPORTS

The reports issued on this program will describe, in detail, the tests made, the test circumstances, and the results and data obtained. Conclusions or comments which appear to be of value, will be made based upon the tests made. Suggestions or recommendations for utilization or operation or for technical improvements will also be included where warranted.